

Child Labor in Sindh, Pakistan: Patterns and Areas in Need of Intervention

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Abstract: Child labor remains a predominant issue in Pakistan despite the country's existing policies and frameworks aimed at abolishing it. Through this study, we investigated the child labor distribution across Sindh and examined the factors that shape the regional patterns. We analyzed the data available through the 2018–19 Sindh Multiple Indicator Cluster Surveys, MICS 6, from 20,030 households with 40,633 children in the 5–17 age bracket. By applying prevalence statistics, chi-square tests, and regression modeling to these data, we investigated the trends in child labor prevalence, identified the correlation between child labor and various socioeconomic and geodemographic variables, and finally mapped the geospatial patterns of child labor across districts in Sindh, enabling us to identify and prioritize the districts in need of immediate intervention. The findings revealed that about 20 percent of the children in Sindh were engaged in child labor, with a high prevalence among males and in the 15–17 age bracket. Moreover, poverty and rural dwellings raise this issue. Other socioeconomic and geographic factors reinforcing this issue are a lack of education among children, mothers, or caretakers and mothers' or caretakers' functional difficulties. However, children's functional difficulties lower their prevalence in labor. Among the 29 districts across Sindh, Kambar Shahdadkot has the highest prevalence of child labor.

Keywords: child labor; logistic regression; geospatial mapping; MICS; spatial patterns; Sindh; Pakistan



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1. Introduction

Child labor is a growing global concern with 160 million children as victims of this predatory practice across the world. According to the International Labour Office and United Nations Children's Fund [1], this figure marks a worrying trend, particularly with the economic aftershocks of the COVID-19 pandemic pushing more children into exploitative work. It exists across the developing as well as the developed nations. Sub-Saharan Africa, being the most significant, has 86.6 million child laborers, which is 23.9 percent of the global share in child labor. Central and South Asia follow, with 26.3 million child laborers, representing 5.5 percent of the global share [1].

While child labor definitions vary culturally, generally it is considered as 5–17-year-old children's engagement in work, not classified as permissible light or non-hazardous work [1]. Moreover, child labor does not include household chores or family business-related activities, provided these do not adversely affect the child's health or education. According to the UNICEF MICS 2018–19 report, child laborers are children involved in economic activities or household chores beyond age-specific thresholds.

In 2021, the International Labour Organization (ILO) reported that child labor is predominant in lower-middle-income and low-income countries, contributing 43 percent and 41 percent, respectively, to the global share [1]. At the beginning of 2020, there were 63 million girls and 97 million boys among the 160 million child laborers across the world. Figure 1 illustrates the percentage of children aged 5–17 years in 2020, who were engaged in child labor and did not attend school; more than one-third of these children were not

attending school. As we move to the right-hand side of the graph, it can be seen that the highest proportion of out-of-school children were 15–17 years old. A higher number of boys were out of school compared to girls, and urban children were more frequently out of school than their rural counterparts. Despite the critical importance of the impact of child labor, there remains a paucity of evidence on the causal relationship between child labor and school attendance, particularly whether child labor keeps children out of school or whether school attendance reduces the prevalence of child labor.

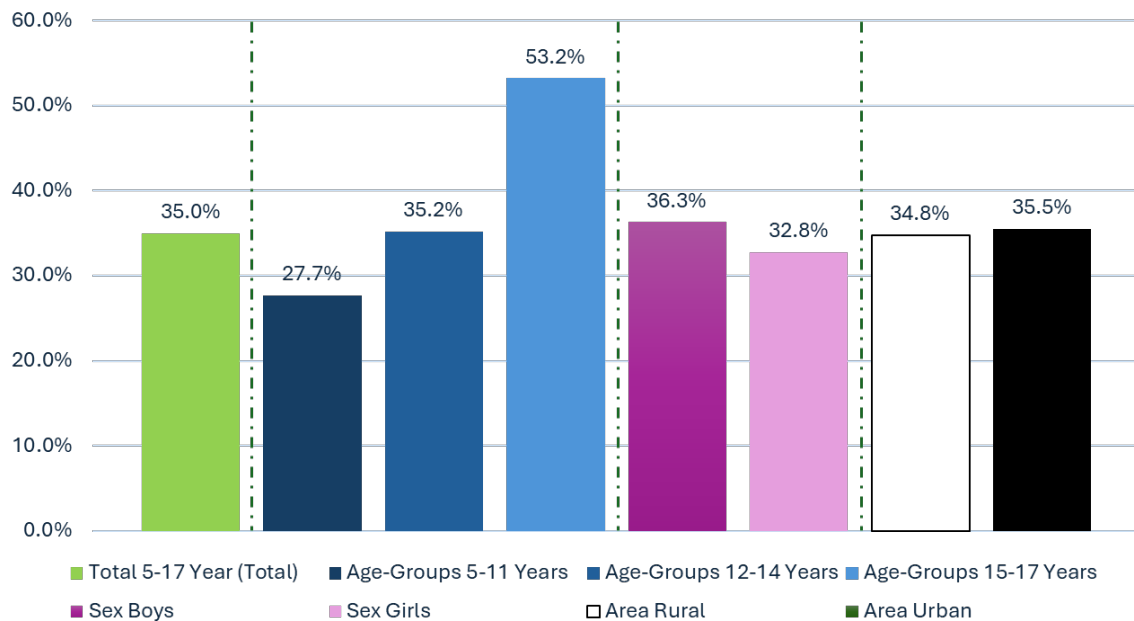


Figure 1. Global percentage of 5–17-year-old children in child labor not attending school in 2020, by age, sex, and area of residence. Data source: ILO (2021).

While eradicating child labor is not explicitly enumerated among the 17 Sustainable Development Goals (SDGs) set by the United Nations in 2015, it is implicitly integrated as Indicator 8.7.1, under Target 8.7, in SDG 8 [2]. It aims to take prompt and effective measures to end child labor by 2025 and create opportunities for conventional work that would drive economic growth. Abolishing child labor will advance progress across other SDGs as well, particularly those related to education and health.

For over two decades, the ILO has been advocating for abolishing child labor. Child labor gradually decreased until 2016, shown as a downward trajectory in Figure 2. However, after 2016, this decrease stalled for the first time. The International Labour Office and United Nations Children’s Fund [1] attributed this stagnation to the COVID-19 pandemic, which also contributed to the poverty surge; increasing families’ dependencies on child labor for supplemental income. During this time, school closures worsened the situation, compelling low-income families to send their children to work. Consequently, more children were pushed into child labor.

Researchers have consistently identified poverty as the driving force behind child labor in developing countries [3–9]. However, alternative factors contributing to global child labor are inadequate educational infrastructure [10,11], deep-rooted cultural norms and traditions [12], laxity in law enforcement and general ignorance of pertinent laws [1,12,13], and consistent demand for low-cost labor [14]. Family dynamics [9], insufficient resources and funds for education [15], and migration and displacement [11] further aggravate the situation. Dash et al. [16] argued that discrimination against certain ethnic and minority groups limits their access to education and employment opportunities, hence perpetuating child labor. Adding a nuanced perspective on child labor, Iqbal et al. [17] denounced child labor as not only violating human rights; it also has detrimental effects on children’s

health, such as malnutrition and stunted development, depriving children of their rights to education.

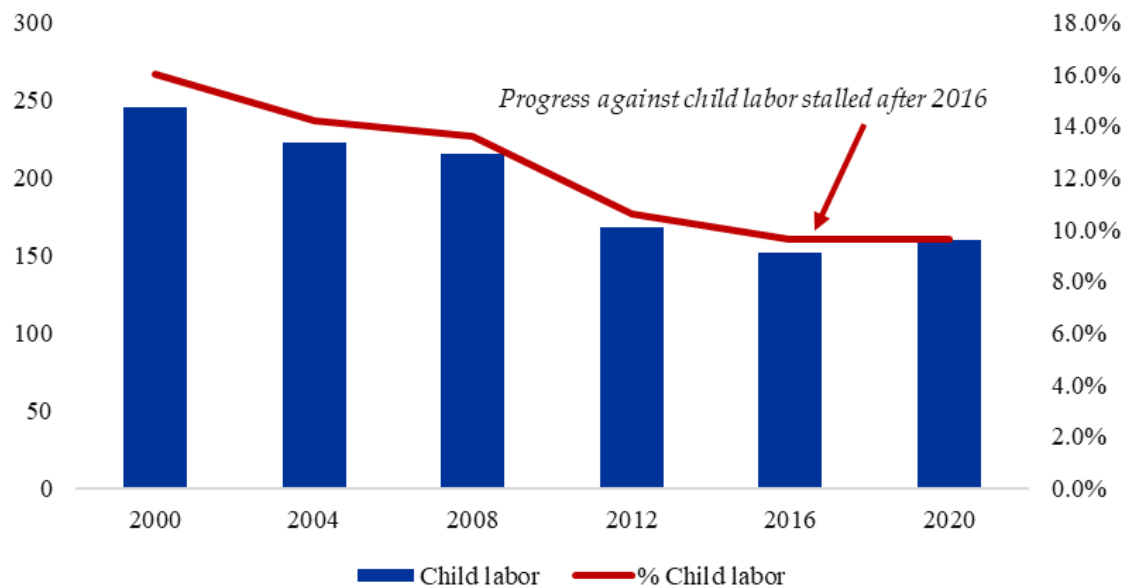


Figure 2. Global child labor trend 2000–2020. Data source: ILO (2021).

There are federal and provincial laws in Pakistan that prohibit child labor across the country. The Employment of Children Act 1991 (Act V) [18] applies to the entire country and states that a child who has not attained the age of 14 years cannot be employed in certain occupations or workshops. However, this exclusion does not apply to children who work in a family business. In addition to this federal law, provinces are responsible for having their own laws to regulate and prohibit child labor. The Khyber Pakhtunkhwa Prohibition of Employment of Children Act 2015 (Act XIX) specifically prohibits child labor in Khyber Pakhtunkhwa province [19]. The Punjab Restriction on Employment of Children Act 2016 applies to employment or work in any establishment in Punjab, prohibiting the employment of children under the age of 14 in hazardous occupations such as brick kilns, mining, domestic work, etc. Similarly, the Baluchistan Employment of Children (Prohibition and Regulation) Act 2021, prohibits and regulates the employment of children in Baluchistan, and the Sindh Prohibition of Employment of Children Act, 2017 prohibits child labor in Sindh. It is important to mention here that children engaged in economic activities on the street often fall outside the scope of the labor laws [20]. The rationale behind this is that most of the child labor laws refer to children employed by someone, whereas children working on the street do not fall under this category. In addition to child labor laws that prohibit and regulate the employment of children mentioned earlier, there are laws that regulate the employment of children in specific sectors or industries, such as factories, shops and establishments, and mines. Rehman [15] argued that despite these laws, child labor remains a pressing concern in the country, with approximately 12 million children trapped in this vicious practice, positioning Pakistan as third in child labor among South Asian countries, after India and Bangladesh [4].

While child labor is pervasive across all four provinces in Pakistan, the concentrated demographic distribution of Sindh, in particular, offers a safe haven for this crime. Ram et al. [12] and Rehman [15] suggested that the concentrated demographic distribution exerts intense economic pressure in densely populated areas to compete for employment and resources. This bolsters demand for an informal and cheap labor market, which further exploits child labor and consequently compels underprivileged families to send their children to work. Alam [10] affirmed that in Sindh alone, there are 1.7 million child laborers. These demographic and socioeconomic variations that support child labor prevalence at the provincial and regional level made Sindh a focus for our study.

In 2017, the Government of Sindh enacted “The Sindh Prohibition of Employment of Children Act, 2017”, which prohibits minors’ employment and regulates adolescents’ employment in certain industries [18]. Parallel laws that address child labor in Pakistan are the Employment of Children Act, of 1991, the Bonded Labor System (Abolition) Act of 1992, and the Minimum Wages Ordinance, of 1961. Violating these laws has severe consequences [18]; however, child labor remains a persistent issue in Sindh [12]. Dash et al. [16] proposed that sending children to school can break the vicious cycle of child labor. However, this comes with a toll of investing resources and efforts to develop affordable and accessible educational infrastructure. The current statistics on out-of-school children in Pakistan are alarming; on 9 May 2024, Pakistan declared a nationwide education emergency with 26 million children out of school [21]. As mentioned earlier, there is no evidence for the causal relationship between child labor and out-of-school children.

Meeting UNICEF’s goal of abolishing child labor by 2025 demands considerable effort. The purpose of our study was to investigate the distribution of child labor across Sindh in association with sociodemographic, economic, and contextual factors. For this, we examined the disparities across genders and socioeconomic groups, and the underlying factors contributing to the observed spatial patterns of child labor in Sindh, Pakistan. We analyzed data from the 2018–19 Sindh Multiple Indicator Cluster Surveys, MICS, Series 6 [22] to explain the pattern in the prevalence of child labor within the province. We further employed regression analysis on MICS data and identified correlations between the prevalence of child labor and a range of socioeconomic and demographic variables, which enabled us to identify and prioritize the districts most in need of immediate intervention. This study offers a nuance of child labor dynamics and informs targeted interventions. Our study was guided by the following research question: “What are the spatial patterns of child labor prevalence in Sindh, Pakistan, and how do socio-economic and demographic factors influence these patterns?”

2. Materials and Methods

To address the research question, we conducted a comprehensive analysis of data from Sindh MICS 6, employing prevalence statistics, Pearson chi-square tests, and regression modeling. We systematically mapped the prevalence rates and odds ratios (ORs) across the districts in Sindh.

2.1. Data

We applied the quantitative research approach to the secondary data from the 2018–19 Sindh MICS 6, provided by the Bureau of Statistics et al. [22]. The datasets comprised interviews with 20,030 households, encompassing 40,633 children in 5–17 years age bracket, across 1027 enumeration areas (EAs) in 29 districts of Sindh, with clear distinctions between rural and urban locales. We grounded our analysis in the responses to the child labor questionnaire administered to the mother or primary caretaker of a randomly selected child in the 5–17 years age group within each household.

Next, we reviewed the literature and formulated the research question presented earlier. Subsequently, we employed descriptive statistics (frequency) and prevalence tests for initial data analysis and used logistic regression for inferential analysis, as suggested by Cohen et al. [23]. Finally, we interpreted the results and drew conclusions drawn from our analysis.

The MICS data on child labor applied three age-specific thresholds for permissible hours of economic or other activities before being classified as child laborers: (a) 1 h or more for children aged 5–11 years, (b) 14 h or more for children aged 12–14 years, and (c) 43 h or more for those aged 15–17 years.

We used a combination of both univariate (descriptive analysis) and multivariate (chi-square and logistic regression) analysis in this study. This was performed by running a logistic regression on each of the shortlisted predictors to observe the response of the outcome variable.

Both outcome and predictor variables were categorical, represented by distinct categories contrary to numerical values, and dichotomous, having two distinct and mutually exclusive values (yes/no, male/female). We constructed the outcome or dependent variable “child Labor” in SPSS using the “or” function that assigned value “1” if a child was engaged even for 1 h as mentioned in the survey questionnaire in any of the following activities: working on a farm, household plot, or food garden or caring for animals; assisting in the family business, a relative’s business with or without pay, or running their own business; producing or selling articles, handicrafts, clothing, food or agricultural products; or engaging in any other activity for monetary compensation or equivalent.

The predictors or independent variables shortlisted for this research were demographic factors (sex and age), educational background (child’s education and mother’s education), health and functional status (child’s functional difficulties and mother’s functional difficulties), socioeconomic status (wealth index quintile), and contextual factors (area, divisions, and districts). The variable “sex” had two categories, male and female. Age was divided into three categories: 5–11 years, 12–14 years, and 15–17 years. Child’s education and mothers’ education each had the same five categories: pre-primary or none, primary, middle, secondary, and higher. The child’s functional difficulty and mother’s functional difficulty were categorized into “has functional difficulty” and “has no functional difficulty”. The wealth index quintile had these five categories: poorest, second, middle, fourth, and richest. In the analysis, key contextual variables were considered to account for the geographical and administrative variations. The “Area” variable was categorized into rural and urban settings. Additionally, the region was divided into six major administrative divisions: Hyderabad, Karachi, Larkana, Mirpurkhas, Shaheed Benazirabad, and Sukkur. Within these divisions, further granularity was achieved by considering the 29 districts, including Badin, Dadu, Hyderabad, Jamshoro, Matiari, Sujawal, Tando Allahyar, Tando Muhammad Khan, and others, to provide a detailed understanding of the spatial distribution across the province.

2.2. Data Treatment

As mentioned earlier, the outcome variable and predictor variables were dichotomous, yielding two distinct and mutually exclusive values (yes/no, male/female, and rural/urban). The sample weight for children aged 5–17 was applied to the data. We conducted a series of analyses, including prevalence tests, cross-tabulation (chi-square tests), and logistic regression. A significance level of $p < 0.05$ was used to determine statistical significance. To ensure the inclusion of all relevant data, we applied a filter and utilized the “Select Case” function in SPSS. Moreover, geospatial mapping techniques were employed to map the prevalence of child labor and the odds ratios at the district level.

2.2.1. Prevalence

A prevalence test was run to analyze the distribution of values associated with the outcome variable Child Labor. It summarized the frequency of occurrence of each variable, which is the number of child laborers in Sindh. This prevalence test proved instrumental for descriptive statistics, data cleaning, and variable selection. By generating a frequency table, the test facilitated a summary of the distribution of categorical variables. We systematically tallied the cases within each category using MICS data to rectify any missing values before proceeding to the next analysis.

2.2.2. Statistical Analysis

To establish if there was a significant association between the outcome and predictor variables, we applied a chi-square test with a pre-established significance level of 0.05 and compared the p -values of each predictor variable against this significance level. Subsequently, we considered variables with p -values above this threshold as statistically insignificant and rejected them.

Given that the outcome and several predictor variables were dichotomous or categorical, we applied logistic regression to the data. The rationale for running logistic regression was to model the relationship between the categorical outcome variable, “Child Labor”, and the predictor variables. In this analysis, we evaluated odds ratios (ORs) by designating a reference category for each variable. The effect of all other categories within each variable was then assessed relative to this reference category, allowing us to examine how changes in the predictor variables were associated with variations in the likelihood of the outcome variable, “Child Labor”.

3. Results

In this section, we present the results of the prevalence test, chi-square test, and logistic regression on the 2018–19 Sindh MICS 6 data.

3.1. Prevalence

As of the MICS Sindh 2018–19 survey, the prevalence test results presented in Table 1a,b reveal that 8210 out of 40,633 5–17-year-old children in Sindh were engaged in child labor, which is more than 20 percent of child laborers. The results indicate that children’s engagement in labor progresses with age, with 11 percent for 5–11-year-old, 24 percent for 12–14-year-old, and 33 percent for 15–17-year-old children; the prevalence of child labor is the highest in the 15–17 years and the lowest in the 5–11 years age groups.

Table 1. Socioeconomic, demographic, and geographic factors distribution of child labor in Sindh (N = 40,633).

| | | (a) | | | |
|--------------------------------|------------------------------|--------------------------|----|------|----|
| Variables | Categories | Responses and Percentage | | | |
| | | No | % | Yes | % |
| Sex | Male | 16,537 | 78 | 4733 | 22 |
| | Female | 15,886 | 82 | 3477 | 18 |
| Area | Urban | 17,336 | 88 | 2304 | 12 |
| | Rural | 15,087 | 72 | 5906 | 28 |
| Age | 5–11 | 16,050 | 89 | 2052 | 11 |
| | 12–14 | 11,257 | 76 | 3629 | 24 |
| | 15–17 | 5116 | 67 | 2529 | 33 |
| Child’s education | Pre-primary or none | 15,386 | 77 | 4701 | 23 |
| | Primary | 10,754 | 83 | 2191 | 17 |
| | Middle | 3493 | 82 | 786 | 18 |
| | Secondary | 2005 | 85 | 363 | 15 |
| | Higher | 781 | 82 | 167 | 18 |
| Mother’s education | Pre-primary or none | 21,041 | 75 | 7053 | 25 |
| | Primary | 3761 | 86 | 595 | 14 |
| | Middle | 1789 | 93 | 135 | 7 |
| | Secondary | 2965 | 92 | 266 | 8 |
| | Higher | 2859 | 95 | 153 | 5 |
| | Missing/DK | 7 | 44 | 9 | 56 |
| Child’s functional difficulty | Has functional difficulty | 5102 | 84 | 988 | 16 |
| | Has no functional difficulty | 27,321 | 79 | 7222 | 21 |
| Mother’s functional difficulty | Has functional difficulty | 1211 | 73 | 455 | 27 |
| | Has no functional difficulty | 31,122 | 80 | 7679 | 20 |
| | No information | 91 | 54 | 76 | 46 |
| Wealth Index quintile | Poorest | 5827 | 64 | 3305 | 36 |
| | Second | 6400 | 71 | 2594 | 29 |
| | Middle | 7126 | 84 | 1393 | 16 |
| | Fourth | 7180 | 92 | 584 | 8 |
| | Richest | 5890 | 95 | 335 | 5 |

Table 1. Cont.

| | | (a) | | | |
|-----------|----------------------|--------------------------|----|------|----|
| Variables | Categories | Responses and Percentage | | | |
| | | No | % | Yes | % |
| Division | Hyderabad | 7540 | 82 | 1620 | 18 |
| | Karachi | 10,532 | 92 | 902 | 8 |
| | Larkana | 4072 | 68 | 1936 | 32 |
| | Mirpurkhas | 2379 | 63 | 1387 | 37 |
| | Shaheed Benazirabad | 3851 | 77 | 1126 | 23 |
| | Sukkur | 4049 | 77 | 1239 | 23 |
| | | (b) | | | |
| Variables | Categories | Responses and Percentage | | | |
| | | No | % | Yes | % |
| Districts | Badin | 1326 | 78 | 379 | 22 |
| | Dadu | 1039 | 82 | 222 | 18 |
| | Hyderabad | 1517 | 95 | 80 | 5 |
| | Jamshoro | 747 | 89 | 95 | 11 |
| | Matiali | 579 | 82 | 124 | 18 |
| | Sujawal | 674 | 84 | 126 | 16 |
| | Tando Allahyar | 592 | 76 | 183 | 24 |
| | Tando Muhammad Khan | 386 | 76 | 125 | 24 |
| | Thatta | 681 | 70 | 285 | 30 |
| | Karachi Central | 1573 | 85 | 278 | 15 |
| | Karachi East | 2059 | 92 | 167 | 8 |
| | Karachi West | 2796 | 93 | 204 | 7 |
| | Karachi South | 1093 | 94 | 75 | 6 |
| | Korangi | 1617 | 93 | 116 | 7 |
| | Malir | 1395 | 96 | 62 | 4 |
| | Jacobabad | 589 | 59 | 401 | 41 |
| | Kambar Shahdadkot | 679 | 51 | 642 | 49 |
| | Kashmore | 825 | 78 | 237 | 22 |
| | Larkana | 1105 | 76 | 358 | 24 |
| | Shikarpur | 874 | 75 | 299 | 25 |
| | Mirpur Khas | 968 | 74 | 343 | 26 |
| | Tharparkar | 776 | 55 | 636 | 45 |
| | Umer Kot | 635 | 61 | 409 | 39 |
| | Naushahro Feroze | 1287 | 86 | 205 | 14 |
| | Sanghar | 1214 | 63 | 714 | 37 |
| | Shaheed Benazir Abad | 1350 | 87 | 207 | 13 |
| | Ghotki | 1338 | 78 | 379 | 22 |
| | Khairpur | 1597 | 74 | 569 | 26 |
| | Sukkur | 1115 | 79 | 291 | 21 |

The test further reveals gender disparity in child labor in Sindh, with 22.3 percent males compared to 18 percent females engaged in child labor, signaling a higher prevalence of male children in these activities. Moreover, children from rural areas (28 percent) were more susceptible to child labor than those from urban areas.

The results from the variables “child’s education” and “mother’s education” indicate that child labor prevalence decreases with the advancement in the child’s or mother’s educational level. For children’s educational level, 23 percent of children with pre-primary or no education were involved in child labor, the highest proportion among the five categories of educational level. However, there was a noticeable decline in children’s involvement in labor as their educational level improved. A similar pattern exists between the mother’s education level and the child’s engagement in labor; 25 percent of the children were involved in child labor in those cases where the mother had pre-primary or no education. However, this involvement declined with the advancement in the mother’s level of education.

The variables on functional difficulties show interesting prevalence. Child labor was more prevalent among functionally capable children compared to those with functional difficulties. A total of 16 percent of children with functional difficulties were engaged in child labor, compared to 21 percent of children who had no functional difficulty. Conversely, children of mothers or caretakers with functional difficulties were seen to be vulnerable to

child labor. This suggests that the child’s functional difficulty lowers their involvement in labor, whereas the mother’s or caretaker’s functional difficulty increases this involvement.

The prevalence test results on the wealth index quintile underscore the impact of poverty on child labor. A total of 36 percent of children from underprivileged households were in the labor force, compared to 5 percent of children from affluent households. This suggests child labor prevalence decreases with improved financial conditions.

The results at the division level indicate a pronounced disparity in child labor prevalence among the five divisions in Sindh. Mirpurkhas exhibits the highest rate of child labor in Sindh with 37 percent of children involved, while Karachi shows the lowest rate with 8 percent of children involved in the labor force. The findings from the 29 districts across Sindh reveal that Kambar Shahdadkot has the highest frequency with 49 percent of children involved in child labor, whereas Malir has the lowest frequency of child labor with 4 percent involvement.

Mapping Distribution of Child Labor Prevalence at the District Level

For a visual depiction of child labor prevalence at the district level in Sindh, we mapped the results of the prevalence test on the predictor variable “Districts” as shown in Figure 3. The provincial child labor prevalence as established from Sindh MICS 6 data is 20.2 percent. The prevalence test yielded a span of 4.25 to 48.6 percent across the districts in Sindh. Based on the standard deviation, we categorized this range into green for child labor prevalence significantly below the provincial average, yellow for districts that have child labor prevalence close to the provincial average of 20 percent, orange for districts with a higher prevalence than the average, and red for districts with an alarmingly high prevalence, almost twice the provincial rate. According to Figure 3, Kambar Shahdadkot, Tharparkar, and Jacobabad districts are color-coded in red, flagging these districts with extremely high child labor rates, followed by the districts in orange; Umer Kot, Sanghar, and Thatta.

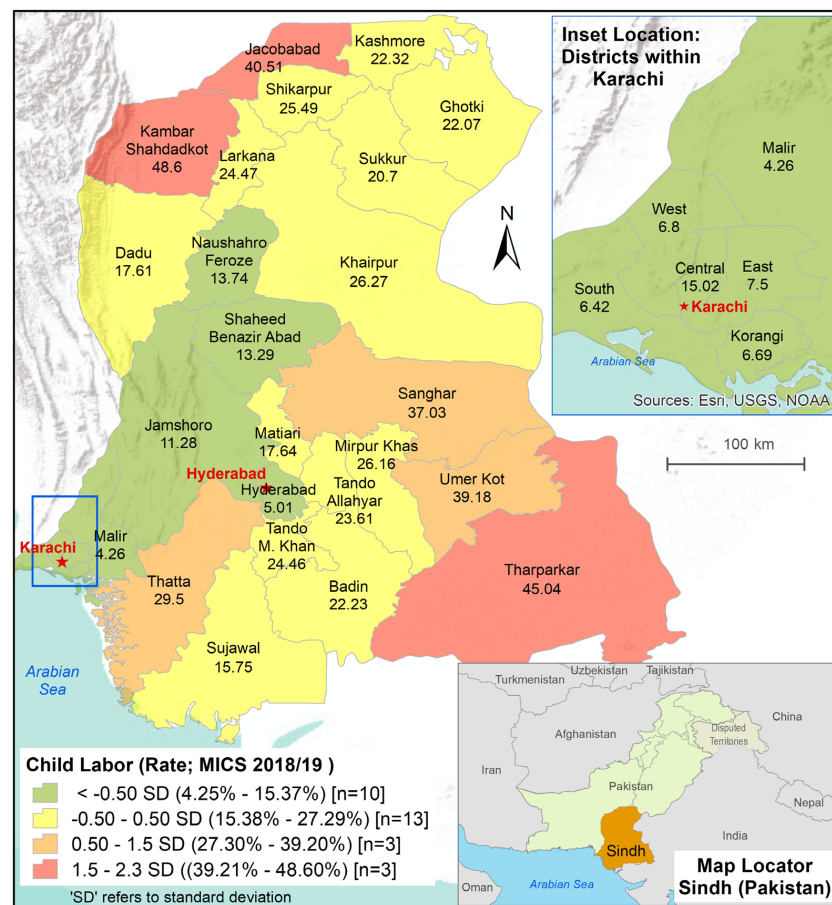


Figure 3. Distribution of prevalence of child labor at district level in Sindh.

3.2. Chi-Square Test

The Pearson chi-square test ascertained any association between the outcome variable “child labor” and the predictor variables, with a pre-established significance level of 0.05. To assess this statistical significance, we compared *p*-values of each predictor variable to the 0.05 significance level, marked the variables with *p*-values exceeding this threshold as statistically insignificant, and subsequently rejected them. The variables that we finally recorded in Table 2a,b are the ones that we shortlisted based on their *p*-value below 0.05. We have discussed each of these variables in this section.

Table 2. Child labor in Sindh—logistic regression table.

| (a) | | | | | | |
|--------------------------------|---------------------------------|---------|-------|-----------|----------|-------|
| Variables | Categories | p-Value | | Odd Ratio | 95% C.I. | |
| | | | | | Lower | Upper |
| Sex | Male (Ref) | | | 1 | | |
| | Female | <0.001 | | 0.688 | 0.65 | 0.728 |
| Area | Urban (Ref) | | | 1 | | |
| | Rural | <0.001 | | 1.194 | 1.107 | 1.288 |
| Age | 5–11 (Ref) | | 0 | 1 | | |
| | 12–15 | <0.001 | | 3.097 | 2.897 | 3.311 |
| | 15–17 | | 0 | 6.484 | 5.968 | 7.045 |
| Child’s education | Pre-primary or none (Ref) | <0.001 | | 1 | | |
| | Primary | <0.001 | | 0.862 | 0.805 | 0.923 |
| | Middle | <0.001 | | 0.791 | 0.712 | 0.878 |
| | Secondary | <0.001 | | 0.583 | 0.506 | 0.673 |
| | Higher | <0.001 | | 0.583 | 0.478 | 0.711 |
| Mother’s education | Pre-primary or none (Ref) | <0.001 | | 1 | | |
| | Primary | <0.001 | | 0.818 | 0.738 | 0.906 |
| | Middle | <0.001 | | 0.696 | 0.574 | 0.844 |
| | Secondary | | 0.292 | 0.922 | 0.792 | 1.072 |
| | Higher | <0.001 | | 0.592 | 0.489 | 0.718 |
| | Missing/DK | <0.001 | | 7.612 | 2.435 | 23.79 |
| Child’s functional difficulty | Has difficulty (Ref) | | | 1 | | |
| | Has no difficulty | | 0.003 | 1.142 | 1.047 | 1.245 |
| Mother’s functional difficulty | Has functional difficulty (Ref) | <0.001 | | 1 | | |
| | Has no functional difficulty | <0.001 | | 0.728 | 0.64 | 0.829 |
| | No information | | 0.005 | 1.714 | 1.175 | 2.499 |
| Wealth index quintile | Poorest (Reference) | <0.001 | | 1 | | |
| | Second | <0.001 | | 0.715 | 0.664 | 0.77 |
| | Middle | <0.001 | | 0.403 | 0.368 | 0.441 |
| | Fourth | <0.001 | | 0.195 | 0.17 | 0.224 |
| | Richest | <0.001 | | 0.133 | 0.111 | 0.159 |
| Division | Hyderabad (Reference) | <0.001 | | 1 | | |
| | Karachi | <0.001 | | 0.481 | 0.358 | 0.646 |
| | Larkana | <0.001 | | 1.72 | 1.426 | 2.076 |
| | Mirpurkhas | <0.001 | | 2.789 | 2.327 | 3.344 |
| | Shaheed Benazirabad | | 0.032 | 0.805 | 0.66 | 0.982 |
| | Sukkur | <0.001 | | 1.521 | 1.261 | 1.833 |

| (b) | | | | | | |
|-----------|---------------------|---------|-------|----------------|----------|-------|
| Variables | Categories | p-Value | | Odd Ratio (OR) | 95% C.I. | |
| | | | | | Lower | Upper |
| District | Badin (Reference) | <0.001 | | 1 | | |
| | Dadu | | 0.806 | 1.025 | 0.841 | 1.249 |
| | Hyderabad | <0.001 | | 0.617 | 0.471 | 0.808 |
| | Jamshoro | | 0.007 | 0.702 | 0.543 | 0.907 |
| | Matari | | 0.782 | 0.967 | 0.761 | 1.228 |
| | Sujawal | <0.001 | | 0.6 | 0.475 | 0.757 |
| | Tando Allahyar | <0.001 | | 1.532 | 1.234 | 1.902 |
| | Tando Muhammad Khan | | 0.64 | 1.061 | 0.829 | 1.357 |

Table 2. Cont.

| Variables | Categories | (a) | | | |
|-----------|-------------------|-----------------|------------|-------|--------|
| | | <i>p</i> -Value | Odds Ratio | Lower | Upper |
| | Thatta | <0.001 | 1.951 | 1.599 | 2.38 |
| | Karachi Central | <0.001 | 9.055 | 6.675 | 12.283 |
| | Karachi East | <0.001 | 2.881 | 2.102 | 3.949 |
| | Karachi West | <0.001 | 2.455 | 1.811 | 3.328 |
| | Karachi South | <0.001 | 2.839 | 1.978 | 4.077 |
| | Korangi | <0.001 | 2.7 | 1.939 | 3.761 |
| | Jacobabad | <0.001 | 1.614 | 1.321 | 1.971 |
| | Kambar Shahdadkot | <0.001 | 3.039 | 2.528 | 3.652 |
| | Kashmore | 0.007 | 0.75 | 0.609 | 0.924 |
| | Larkana | <0.001 | 1.386 | 1.143 | 1.682 |
| | Mirpur Khas | <0.001 | 0.62 | 0.512 | 0.751 |
| | Tharparkar | 0.097 | 1.161 | 0.973 | 1.385 |
| | Naushahro Feroze | 0.72 | 1.041 | 0.836 | 1.296 |
| | Sanghar | <0.001 | 3.561 | 2.958 | 4.287 |
| | Ghotki | 0.348 | 1.094 | 0.907 | 1.321 |
| | Khairpur | 0.03 | 1.211 | 1.018 | 1.439 |
| | Sukkur | <0.001 | 0.195 | | |

For the variable “sex”, the Pearson chi-square test yielded a *p*-value of 0.001, which is below the significance level of 0.05, signaling a statistically significant gap in child labor engagement between male and female children in Sindh. A higher percentage of male children are involved in child labor than their female counterparts. Likewise, the *p*-value for the variable “area” was less than 0.05, revealing a significant difference in child labor in rural versus urban areas in Sindh. The rural areas exhibited a higher propensity for child labor.

For the variable “age”, the *p*-value 0.001 indicated a significant variation in child labor across the three age groups of 5–11, 12–14, and 15–17 years. Children’s education level also yielded a *p*-value below 0.05, reflecting a significant correlation between the child’s educational level and their susceptibility to child labor; a low education level increased the likelihood of the children’s involvement in labor. Moreover, there were significant variations across the educational levels: pre-primary or none, primary, middle, secondary, and higher. Mother’s educational levels exhibited similar results, with less educated mothers’ children being prone to engage in child labor.

The *p*-value for children’s functional difficulties was below the significance level, establishing a linkage with child labor. Children without functional difficulties are more susceptible to child labor. A contrary trend was observed with mothers’ functional difficulties, where children of mothers with such difficulties were more frequently engaged in labor.

The wealth index quintile demonstrated a *p*-value below the significance threshold, reflecting notable variation among the five wealth index levels in Sindh. The poorest quintile harbors the highest percentage of child laborers in Sindh, whereas the wealthiest quintile exhibits the lowest incidence. The chi-square test results for divisions provided a *p*-value below 0.05, showing significant differences in child labor distribution across the six divisions of Hyderabad, Karachi, Larkana, Mirpurkhas, Shaheed Benazirabad, and Sukkur in Sindh. Similarly, the district-level chi-square results also yielded a *p*-value below the significance level, which confirmed significant variability in child labor incidence across the 29 districts in Sindh.

The Pearson’s chi-square test results indicate that gender, area, age, child’s education, mother’s education, child’s functional difficulties, mother’s functional difficulties, wealth index quintile, divisions, and districts have a *p*-value less than 0.05, confirming a correlation with child labor.

3.3. Logistic Regression

In this section, we present the findings from the logistic regression, as recorded in Table 2a,b. The fourth column of the table shows the odds ratio—OR.

For the variable “Sex”, “male” being the reference, the odds of a female in child labor are 0.7, with a 95% confidence interval and 0.65–0.73 as the lower and upper limit, indicating more male children involved in the labor force than their female counterparts.

For the predictor variable “Area”, considering urban as the reference, the odds that children from rural areas will be involved in the labor force are 1.2. With a 95% confidence interval, the lower and upper limits being 1.1 and 1.29, respectively, the results indicate that child labor is more dominant in rural areas compared to those in urban settings.

For the independent variable “Age”, considering the 5–11 years age bracket as the reference, the odds for the 12–15 years old group being involved in child labor are almost three times higher, with 2.9 and 3.3 as the lower and upper limits, respectively, with a 95% confidence interval. In the age bracket of 15–17 years, the odds are more than six times with a 95% confidence interval with 5.9 and 7 as the lower and upper limits, respectively, revealing that older children have more chances of being involved in child labor, potentially due to their ability to perform physically demanding and hazardous tasks.

For “Child’s education”, with pre-primary or no education as a reference, the odds of a child with primary education being engaged in child labor reduced to 0.86, with lower and upper limits of 0.8 and 0.9 with a 95% confidence interval. These further reduce to 0.79 among children with middle education, with lower and upper limits of 0.71 and 0.88 with a 95% confidence interval. Finally, it plummets to 0.58 as children acquire secondary and higher education, with the lower and upper limits being 0.5 and 0.7 with a 95% confidence interval. This indicates that as the level of a child’s education rises, the odds of their involvement in child labor steadily decline. A similar trend was observed for “Mother’s education”. With pre-primary or no education as the reference, the odds of a child being engaged in labor decrease to 0.8 for those whose mothers have primary education. The lower and upper limits are 0.7 and 0.9, respectively, with a 95% confidence interval. The odds keep on reducing as the mother’s education level keeps on improving.

For “Child’s functional difficulties”, with functional difficulty as the reference, the odds of a child with no functional difficulty being in the labor force increase by 1.14, with the lower and upper limits being 1.04 and 1.24, respectively, with a 95% confidence interval. This reflects that there are more chances that a child with no functional difficulty will be involved in child labor. On the contrary, “Mother’s functional difficulties” increase the odds of a child being in the labor force. The reference is that the mother has functional difficulty, and the odds of a child with a mother with no functional disability being in the labor force are reduced by 0.7, with lower and upper limits of 0.6 and 0.8 with a 95% confidence interval.

For the “Wealth index quintile”, the “poorest” household as the reference, the odds of children from the “second” [poorest] household being involved in work reduce to 0.7, with 0.66 and 0.77 being the lower and upper limits with a 95% confidence interval. The odds of children’s involvement in labor gradually decline with improved economic household conditions. Children from the richest household have the lowest odds of 0.13, with the lower and upper limits being 0.11 and 0.16, respectively, in a 95% confidence interval.

For the variable “Division”, with Hyderabad as the reference, Mirpurkhas stands out with the highest odds for child labor being 2.7, with 2.3 and 3.3 as the lower and upper limits with a 95% confidential interval. Karachi, on the other extreme, exhibits the lowest odds of 0.48 for child labor, with 0.36 and 0.65 the lower and upper limits with a 95% confidence interval.

For the variable “District”, Badin is the reference. The districts of Dadu, Matiari, Tando Muhammad Khan, Malir, Shikarpur, Umerkot, Naushahro Feroze, Shaheed Benazir Abad, and Ghotki have similar odds of child labor as Badin. While Karachi Central stands out with nine times higher odds of children in labor compared to that of Badin. Sukkur has the lowest odd ratio (0.195). The reason for the high OR in Karachi Central, though it has a low prevalence compared to the provincial average of 20%, is the socioeconomic conditions in Karachi. Karachi is the most densely populated city in Pakistan but is low in resources that would accommodate even the basic needs of the growing population. It is divided into six divisions which are further divided into 29 districts. Karachi Central is one of these 29 districts. The population of Sindh is concentrated in Karachi, particularly in Karachi

Central; the rest of the province has a scattered population. Due to the prevailing poverty (also one of the factors for child labor), underprivileged families send their children to work. Therefore, the OR of 9 in Karachi Central gives a more accurate representation of a child being involved in labor, compared to the district Badin.

Mapping Distribution of Child Labor Odds Ratio at the District Level

Derived from the logistic regression analysis, Figure 4 is a visual representation of the distribution of odds ratio (OR) at the district level across Sindh. Using Badin as the reference, the OR span extends from 0.6 to 9.05. We segmented this span into five intervals and color-coded each interval for clarity. The first interval with an OR of 0.60–0.70 in dark green shows a low OR compared to the reference (Badin, OR = 1), the second interval with an OR of 0.71–1.00 in light green has districts with an OR close to the reference, the third one with an OR = 1 is the reference in yellow, the fourth interval with an OR of 1.01–2.00 in orange has districts with a higher OR than the reference, and the fifth interval with an OR of 2.01–9.05 in red shows an alarmingly high odds ratio to the reference. As illustrated in Figure 4, Karachi Central, Kambar Shahdadkot, and Sanghar marked in red show alarmingly high odds ratios, signaling a need for critical intervention to curb child labor in these districts.

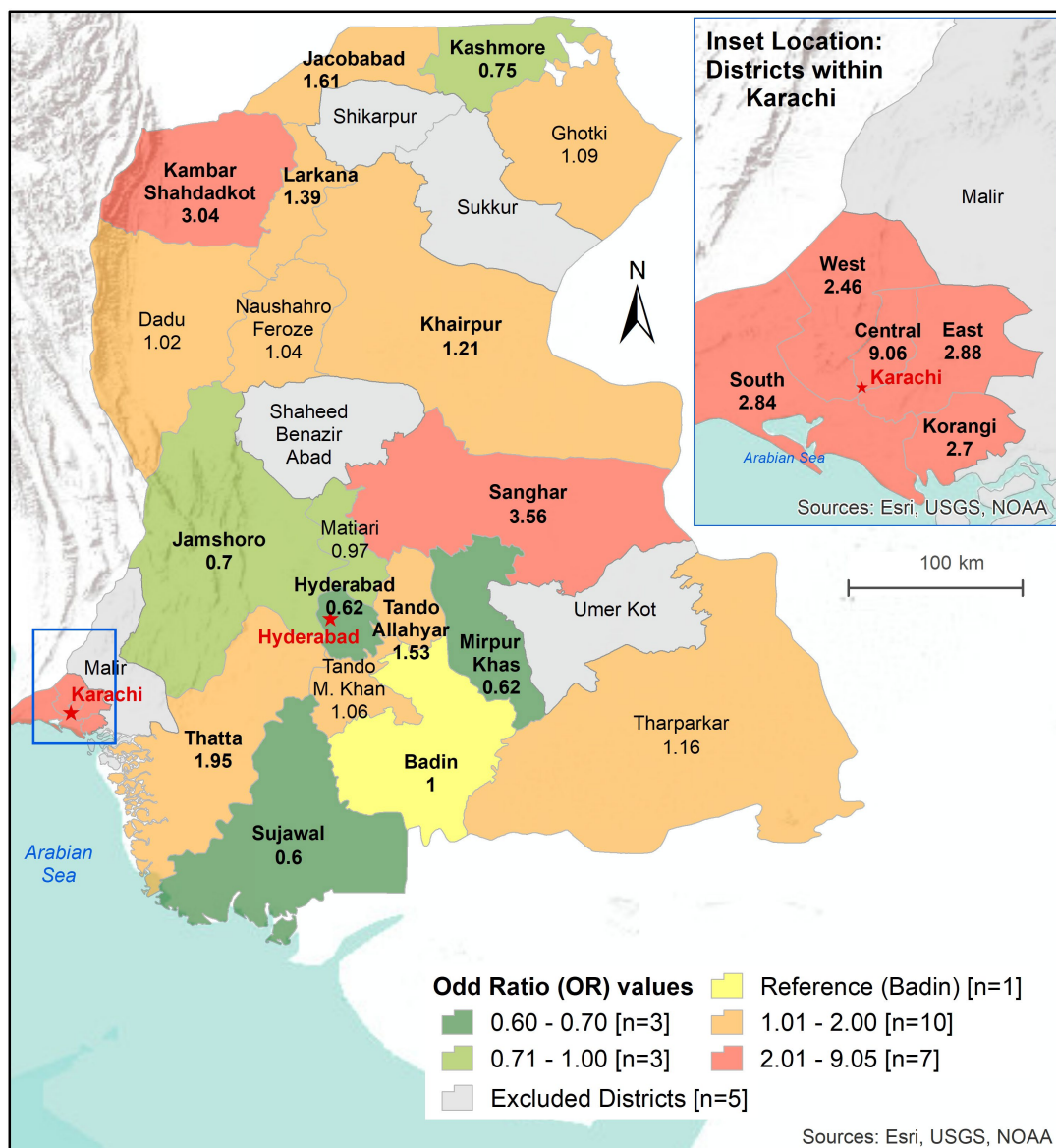


Figure 4. Distribution of odds ratio of child labor at district level in Sindh.

4. Discussion

Through this study, we analyzed the child labor distribution across Sindh in relation to the prevailing sociodemographic, economic, and contextual factors. The rationale behind this study was to refine the analysis of these factors and to explain their association with child labor to precisely delineate the issue.

Applying the prevalence statistics, chi-square tests, and regression modeling on data from the 2018–19 Sindh Multiple Indicator Cluster Survey “MICS 6”, we analyzed the trends in child labor prevalence across the province, explored the correlation between child labor prevalence and various socioeconomic and geodemographic variables, and mapped the geospatial patterns of child labor in 29 districts across Sindh, enabling us to identify and prioritize the districts in need of immediate intervention.

The results from the Sindh MICS 6 data indicate that more than 20 percent of the children in Sindh were engaged in child labor, which is less than the 26 percent reported in the 2014 Sindh MICS 5 report. This suggests that the child labor rate decreased over the reporting period. However, a closer look at the rate of decrease reveals that there was a one percent decrease per year. This is not a substantial decrease in one year to curb such a critical issue, keeping in mind that child labor not only impedes the physical growth and education of a child but is also linked to developing mental health issues at a later age [10]. For the same period as our study, ILO Publishing [24] reported Punjab, the largest province of Pakistan, having the highest rate of child labor in the country. Child labor prevalence appears to be a regional issue in South Asia. Das [4] reported that India has the highest number of child laborers in South Asia (5.8 million), followed by Bangladesh (5 million) and Pakistan (3.4 million).

For this study, we shortlisted the predictor variables from past studies as sex, area, age, child’s education, mother’s education, child’s functional difficulty, mother’s functional difficulty, wealth index quintile, division, and district and categorized them under demographic, socioeconomic, and regional factors for this discussion.

4.1. Demographic Factors

The prevalence test results on the demographic variables sex, age, and child’s education show a high prevalence of child labor among males, children in the 15–17 age bracket, and children with pre-primary or no education. The Pearson chi-square tests on sex, age, and child’s education yielded p -values below 0.05, indicating a significant difference among the categories of each of these variables. Finally, logistic regression analysis indicates that female children (OR = 0.69), young children in the 5–11 year age bracket (OR = 1), and children with higher education (OR = 0.58) have the lowest odds of being engaged in child labor in their categories.

The results from similar studies vary across the world. Das (2022) reported 5–14-year-old children as the most vulnerable group (75 percent involvement) in child labor in India, whereas Hossain (2023) identified 15–17-year-old children as the most susceptible (74 percent involvement) to child labor in Bangladesh. Jephtah et al. [7] reported similar results of increasing chances of child labor with the increase in age in Nigeria. The highest incidence of child labor in the 15–17 age bracket in Sindh, Bangladesh, and Nigeria is reflective of employers’ preference for older children in the workforce, who are perceived as more skilled compared to their younger counterparts. This perception can also be attributed to their ability to perform physically demanding and hazardous tasks. Moreover, older children can easily be admitted into hazardous jobs because the employers feel they can perform the task better than their younger counterparts.

The reports on child labor gender in India [4,16] and Bangladesh (Hossain, 2023) are consistent with our findings on child labor in Sindh, which indicate that male children are more likely to be employed than their female counterparts. The gender disparity in child labor across South Asia can be linked to the cultural norms that hold females responsible for household chores and males responsible for making a living for the family. The International Labor Office and United Nations Children’s Fund [1] also reinforced the

higher rate of child labor among boys compared to girls across all age groups. Though, the pattern indicates more boys involved in child labor than girls; Khan [25] argued that girls are susceptible to the worst forms of child labor, including bonded labor and sexual exploitation, which might be a consequence of working in the unregulated and unorganized labor industry of domestic work outside of their home.

The statistical analysis on the variable “Child’s Education” positions education as a dynamic contributor to abolishing child labor. It is significant to mention here that primary education is free in public schools across Pakistan, including Sindh. However, access to public schools is not equally distributed within urban areas and between urban and rural areas [26]. Also, the quality of education in public schools is a continuous challenge in Pakistan, including Sindh [27]. These are the outcomes of institutional weaknesses and poor political decisions [26].

The odds of a child being involved in the labor force in Sindh decrease with the advancement in their educational level (or attainment). However, this is inconsistent at the regional level. Das [4] reported that children with secondary and higher secondary education in India are more likely to be involved in child labor. The risk of child labor in India decreases if the children attend pre-primary and primary schools and increases with secondary education and higher secondary education. Studies conducted in West Bengal, India, more than two decades ago showed similar results of school drop-outs being more involved in child labor [28]. Jephtah et al. [7] also reported child labor is more prevalent among children who did not attend school in Nigeria. However, as mentioned earlier in this report, there is no evidence of whether child labor leads to school dropouts or vice versa.

4.2. Socioeconomic Factors

We grouped the mother’s education, child’s functional difficulty, mother’s functional difficulty, and wealth index quintile under socioeconomic factors. The prevalence test on these variables shows a high prevalence of child labor among children with less educated mothers, children with no functional difficulty, children with mothers or caretakers with functional difficulty, and children from underprivileged families.

The Pearson chi-square test yielded p -values below the 0.05 threshold for all socioeconomic variables, which ascertained significant differences among the categories of each of these variables. The logistic regression analysis indicates that children whose mothers have higher education (OR = 0.59), children with functional disability (OR = 1), children whose mothers have no functional difficulty (OR = 0.72), and children from the “richest” wealth index quintile (OR = 0.13) have the lowest odds of being engaged in child labor.

A mother’s education shows a pattern similar to a child’s education, as discussed in the preceding section. This correlation underscores the role of maternal education in mitigating child labor. A similar pattern prevailed at the regional level. Child labor was most prevalent in India among families with non-educated parents [4,16,28]. Hossain et al. [29] reported a similar pattern in Bangladesh. Jephtah et al. [7] reported similar results; children with less educated mothers or caretakers were more involved in child labor in Nigeria. The rationale behind a mother’s education preventing a child’s involvement in labor is based on the fact that education gives access to financial literacy and superior job opportunities. When mothers attain higher education, they have better career prospects, which reduces the necessity of a child’s engagement in the workforce.

The child’s functional difficulty versus the mother’s functional difficulty shows a counter pattern. The former reduces the child’s chances of being in the workforce, whereas the latter increases these chances. The rationale behind the first scenario might be that the children with functional difficulty are not able to conduct certain tasks, making them less desirable as employees. In the case of the mother’s functional difficulty, the mother’s inability to perform certain tasks lowers their options to join the workforce, hence compelling the children to work. Hossain et al. [29] reported a similar impact of a child’s functional difficulty and mother’s functional difficulty on child labor in Bangladesh as in Sindh.

Studies indicate poverty is the main driving force of child labor in developing countries. Our study showed similar results of the highest incidence of child labor among the most

underprivileged families. As families' financial conditions improve, the involvement of children in the labor force reduces. Gul et al. [6] reported a similar trend of poverty leading to child labor in the Mardan district of the Khyber Pakhtunkhwa province of Pakistan. Jephtah et al. [7] also reported that children from poor financial backgrounds are more likely to be engaged in child labor in Nigeria.

4.3. Regional Factors

We considered area, division, and district as regional factors. The prevalence test on these variables indicates a high prevalence of child labor in rural areas of Sindh. Moreover, Mirpurkhas and Kambar Shahdadkot have the highest prevalence of child labor at the division and district levels, respectively. The Pearson chi-square test on area, division, and district yielded p -values below 0.05, indicating a significant difference among the categories of each of these variables. Finally, logistic regression analysis placed rural dwelling (OR = 1.19), the Mirpurkhas division (OR = 2.79), and the district Karachi Central (OR = 9.05) with the highest odds of being involved in child labor within their categories.

Hossain et al. [29] and Dash et al. [16] reported higher rates of prevalence of child labor in rural areas in Bangladesh and India, respectively. Jephtah et al. [7] showed similar patterns for their study in Nigeria; children in rural areas were more involved in labor.

Child labor prevalence in rural settings compared to urban areas can be linked to higher employment opportunities in the agricultural sector in rural settings as reported by [1]. Though Karachi Central does not have a high prevalence rate, which means the frequency of child labor in this division is not alarmingly high, the highest odd ratio, OR, places this division in the high-risk zone. The rationale behind this might be that Karachi Central is a densely populated division that offers more job opportunities for children.

The statistical analysis reveals that poverty, area, and age are the three main socioeconomic and geodemographic factors that need attention. We base this interpretation on the incident rate recorded in the last column of Table 1. The "Poorest" in the "Wealth Index Quintile" show the highest frequency of child labor, followed by "15–17 years" in the "age" variable, further followed by "rural" in the "area" variable in Table 1.

There are similar examples of child labor in developing countries, some of which have successfully addressed this issue. Brazil, for example, offers an exemplary model through its comprehensive legal and socioeconomic framework to combat child labor. Along with its strong legal framework that prohibits child labor, Brazil developed specialized units to monitor child labor, particularly in the sectors of agriculture, domestic work, and street vending. To alleviate poverty, which is considered the key driver of child labor, the country has launched several social programs such as Bolsa Familia [30], which provides financial assistance to families who ensure that their children attend school and follow basic health protocols. Moreover, the state offers free compulsory education for up to 17-year-old children, as well as vocational education and apprenticeships for older adolescents.

4.4. Research Limitations and Future Research Options

This study was restricted by some limitations and delimitations. Due to time and financial constraints, we delimited our scope of study to the secondary data available on the UNICEF website instead of gathering primary data by conducting surveys. We utilized the latest datasets publicly available, which limited our work to 2019, and we were unable to explore the findings of prevailing conditions of child labor in Sindh, considering that an education emergency was recently declared in the country, as mentioned earlier.

Our scope of work also delimited our study to explore factors and map child labor prevalence at the district level. Hence, we did not delve into the causal relationship among these factors. Moreover, the results of our study suggest a decline in child labor from 26 percent to 20 percent over five years. However, due to the limited scope of our study, we could not identify the variables that might have contributed to this decline.

These limitations and delimitations offer future research opportunities to investigate the causal relationship and multivariate analysis to comprehend the relationship between

multiple variables. An independent study can also be conducted to investigate the factors that led to the decline of child labor in Sindh from 2014 to 2019.

5. Conclusions

The purpose of this study was to investigate the child labor distribution across Sindh and examine the factors responsible for the regional patterns. We applied prevalence statistics, chi-square tests, and regression modeling to the 2018–19 Sindh MICS 6 datasets and investigated trends in child labor prevalence. We further identified the correlation between child labor and various socioeconomic and geodemographic variables and mapped the geospatial patterns of child labor in districts across Sindh. This enabled us to identify and prioritize the districts in need of immediate intervention.

The findings revealed that about 20 percent of the children in Sindh are engaged in child labor. The three main socioeconomic and geodemographic factors that support child labor are poverty, area, and age. Among the 29 districts across Sindh, Kambar Shahdaskot has the highest prevalence of child labor. Other districts that we identified needing immediate intervention are Tharparker and Jacobabad.

This study informs the policymakers that poverty is the major player in promoting child labor in Sindh. With the prevailing socioeconomic conditions in the rural areas of Sindh, 15–17-year-old children from underprivileged families are forced to enter child labor to support their families. These variables need immediate attention.

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